

**WASHINGTON DEPARTMENT OF ECOLOGY**  
**ENVIRONMENTAL ASSESSMENT PROGRAM**  
**FRESHWATER MONITORING UNIT**  
**STREAM DISCHARGE TECHNICAL NOTES**

**STATION ID:** 05H070  
**STATION NAME:** Squire Creek at Squire Creek Park  
**WATER YEAR:** 2008  
**AUTHOR:** Don Watt

**Introduction**

Watershed Description

Squire Creek drains a steep, north-facing basin covering about 20 square miles upstream of the gage at Squire Creek Park. Much of the basin lies in the Boulder River Wilderness as the stream drains the flanks of Three Fingers South and Whitehorse Mountain. Elevation in the basin ranges from 460 ft at the gage to more than 6800 ft on the higher peaks. Mean basin elevation is 2590 ft. Average basin slope is 57 percent. Over 60 percent of the area is covered in forest canopy. Mean annual precipitation is about 93 inches. Squire Creek and its tributaries provide more than 13 miles of spawning habitat for Chinook, Coho, pink and chum salmon, as well as for steelhead and resident trout.

Gage Location

The gage is on the right bank of Squire Creek, north of the Highway 530 bridge. Access for gage maintenance is through Squire Creek Park property.

Table 1. Basin Area and Legal Description

Drainage Area (square miles)	19.8 square miles
Latitude (degrees, minutes, seconds)	48, 16, 13 (NAD83)
Longitude (degrees, minutes, seconds)	-121, 40, 19(NAD83)

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	171 cfs
Median Annual Discharge (cfs)	115 cfs
Maximum Daily Mean Discharge (cfs)	3030 cfs
Minimum Daily Mean Discharge (cfs)	23 cfs
Maximum Instantaneous Discharge (cfs)	5210 cfs
Minimum Instantaneous Discharge (cfs)	22 cfs
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	311 cfs
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	56 cfs
Number of Days Discharge is Greater Than Range of Ratings	None
Number of Days Discharge is Less Than Range of Ratings	None
Number of Un-Reported Days	None
Number of Days Qualified as Estimates	22 days
Number of Modeled Days	7 days

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Table 2 Discussion (Discharge Statistics)

Mean and median annual discharge values for water year 2008 were about normal for the period of record from 2005 through 2013. There were also no extreme maximum or minimum flow events during the water year. Fourteen days had data qualified as estimates because of instrument drift that introduced potential errors greater than 20 percent of the mean daily discharge. Seven days were qualified as estimates due to the use of the slope-conveyance model for estimating high flow discharge values.

Table 3. Error Analysis Summary.

Potential Logger Drift Error (% of discharge)	6 %
Potential Weighted Rating Error (% of discharge)	11 %
Total Potential Error (% of discharge)	17 %

Table 3 Discussion (Error Analysis)

The potential logger drift error of 6 percent of discharge refers to the amount of instrument drift that has been corrected using a time-weighted adjustment to the stage record.

The potential weighted rating error is calculated based on the quality of individual discharge measurements used to define the rating and on the degree to which those defining measurements conform to the respective rating curve.

Table 4. Stage Record Summary

Minimum Recorded Stage (feet)	3.80 ft
Maximum Recorded Stage (feet)	11.19 ft
Range of Recorded Stage (feet)	7.39 ft

Table 4 Discussion (Stage Record)

Automated gaging equipment performed well at Squire Creek in water year 2008. There were no significant gaps in the stage record during the water year. Fourteen days are qualified as estimated data due to instrument drift that caused potential errors greater than 20 percent of mean daily discharge.

Table 5. Rating Table Summary

Rating Table No.	3	201	
Period of Ratings	10/1 to 4/26	4/26 thru 9/30	
Range of Ratings (cfs)	0.09 to 9370 cfs	0.01 to 9370 cfs	
No. of Defining Measurements	31 Mmt's	41 Mmt's	
Rating Error (%)	11 %	12 %	

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Table 5 Discussion (Rating Tables)

Channel geometry in the gage reach at Squire Creek has been relatively stable through the period of record for this station. The shift from Rating 3 to Rating 201 reflects a minor fill event.

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	Slope Conveyance
Range of Modeled Stage (feet)	8.4 ft to 13.5 ft
Range of Modeled Discharge (cfs)	1900 cfs to 9370 cfs
Valid Period for Model	Oct. 1 thru Sept. 30
Model Confidence	+/- 5 %

Table 6 Discussion (Modeled Data)

The slope conveyance model for Squire Creek is based on a cross-section and longitudinal survey taken on September 16, 2010, and on data from nine channel-control discharge measurements taken between December 2006 and November 2012. Results from this model are applied throughout the period of record for the station because of the overall stability of the channel geometry.

Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date
No surveys were done.	

Table 7 Discussion (Surveys)

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Activities Completed

Routine station maintenance and periodic discharge measurements were carried out.
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